Simplify.

18. $\sqrt{-144}$
19. $\sqrt{-81}$
20. $\sqrt{-64x^4}$
21. $\sqrt{-100a^4b^2}$
22. $\sqrt{-13} \cdot \sqrt{-26}$
23. $\sqrt{-6} \cdot \sqrt{-24}$
24. $(-2i)(-6i)(4i)$
25. $3i(-5i)^2$
26. i^{13}
27. i^{24}
28. i^{38}
29. i^{63}
30. $(5 - 2i) + (4 + 4i)$
31. $(3 - 5i) + (3 + 5i)$
32. $(3 - 4i) - (1 - 4i)$
33. $(7 - 4i) - (3 + i)$
34. $(3 + 4i)(3 - 4i)$
35. $(1 - 4i)(2 + i)$
36. $(6 - 2i)(1 + i)$
37. $(-3 - i)(2 - 2i)$
38. $\dfrac{4i}{3 + i}$
39. $\dfrac{4}{5 + 3i}$
40. $\dfrac{10 + i}{4 - i}$
41. $\dfrac{2 - i}{3 - 4i}$
42. $(-5 + 2i)(6 - i)(4 + 3i)$
43. $(2 + i)(1 + 2i)(3 - 4i)$
44. $\dfrac{5 - i\sqrt{3}}{5 + i\sqrt{3}}$
45. $\dfrac{1 - i\sqrt{2}}{1 + i\sqrt{2}}$
46. Find the sum of $ix^2 - (2 + 3i)x + 2$ and $4x^2 + (5 + 2i)x - 4i$.
47. Simplify $[(3 + i)x^2 - ix + 4 + i] - [(-2 + 3i)x^2 + (1 - 2i)x - 3]$.

Solve each equation.

48. $5x^2 + 5 = 0$
49. $4x^2 + 64 = 0$
50. $2x^2 + 12 = 0$
51. $6x^2 + 72 = 0$
52. $-3x^2 - 9 = 0$
53. $-2x^2 - 80 = 0$
54. $\frac{2}{3}x^2 + 30 = 0$
55. $\frac{4}{5}x^2 + 1 = 0$

Find the values of m and n that make each equation true.

56. $8 + 15i = 2m + 3ni$
57. $(m + 1) + 3ni = 5 - 9i$
58. $(2m + 5) + (1 - n)i = -2 + 4i$
59. $(4 + n) + (3m - 7)i = 8 - 2i$
60. $(m + 2n) + (2m - n)i = 5 + 5i$
61. $(2m - 3n)i + (m + 4n) = 13 + 7i$

62. **ELECTRICITY** The impedance in one part of a series circuit is $3 + 4j$ ohms, ar the impedance in another part of the circuit is $2 - 6j$. Add these complex numbers to find the total impedance in the circuit.

ELECTRICAL ENGINEERING **For Exercises 63 and 64, use the formula $E = I \cdot Z$**

63. The current in a circuit is $2 + 5j$ amps, and the impedance is $4 - j$ ohms. Wh is the voltage?
64. The voltage in a circuit is $14 - 8j$ volts, and the impedance is $2 - 3j$ ohms. W is the current?